

# Unit 4 Lesson 15: Inverse Functions

## 1 What Does It Say? (Warm up)

### Student Task Statement

Here is an *encoded* message, a message that has been converted into a code.

WRGDB LV D JRRG GDB.

Can you figure out what it says in English? How was the original message encoded?

## 2 Caesar Says Shift

### Student Task Statement

1. Now it's your turn to write a secret code!

- Write a short and friendly message with 3–4 words.
- Pick a number from 1 to 10. Then, encode your message by shifting each letter that many steps forward or backward in the alphabet, wrapping around from Z to A as needed.

Consider using this table to create a key for your cipher.

plain text	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
cipher text																										

- Give your encoded message to a partner to decode. If requested, give the number you used.
  - Decode the message from your partner. Ask for their number, if needed.
2. Suppose  $m$  and  $c$  each represent the position number of a letter in the alphabet, but  $m$  represents the letters in the original message and  $c$  the letters in your secret code.

a. Complete the table.

letter in message				
$m$	6	9	19	8
$c$				
letter in code				

- Use  $m$  and  $c$  to write an equation that can be used to *encode* an original message into your secret code.
- Use  $m$  and  $c$  write an equation that can be used to *decode* your secret code into the original message.

### 3 U.S. Dollars and Mexican Pesos

#### Student Task Statement

An American traveler who is heading to Mexico exchanges some U.S. dollars for Mexican pesos. At the time of his travel, 1 dollar can be exchanged for 19.32 pesos.

At the same time, a Mexican businesswoman who is in the United States is exchanging some Mexican pesos for U.S. dollars at the same exchange rate.



1. Find the amount of money in pesos that the American traveler would get if he exchanged:
  - a. 100 dollars
  - b. 500 dollars
2. Write an equation that gives the amount of money in pesos,  $p$ , as a function of the dollar amount,  $d$ , being exchanged.
3. Find the amount that the Mexican businesswoman would get if she exchanged:
  - a. 1,000 pesos
  - b. 5,000 pesos
4. Explain why it might be helpful to write the inverse of the function you wrote earlier. Then, write an equation that defines the inverse function.

### Activity Synthesis

